REMARKS

Claims 5, 6, 12, 14-16, 18-20, 58 and 61-63 are presently pending, of which claims 12, 15 and 58 are being amended.

The amendments to claims 12 and 58 are fully supported by the Specification at least by the following:

> ... For example the adhesion layer 140 can comprise at least one of titanium, aluminum, zirconium and chromium. In one version, the adhesion layer 140 comprises a metal such as titanium that bonds well to both metal and non-metallic materials. ...

[Specification page 18, lines 9-15.] And further by:

> In one version, the mesas 112 comprise a coating 24 having at least one of the contamination-reducing materials described above. For example, substantially the entire mesa 112 can comprise the coating 24 formed from a contamination-reducing material. A suitable height of mesas 112 that substantially entirely comprise the contamination-reducing material may be from about 0.25 micrometers to about 6 micrometers. Alternatively, the mesa 112 can comprise a surface coating 24 of the contamination-reducing material that overlies the rest of the mesa 112. The mesas 112 can comprise a contamination-reducing material comprising at least one of a diamond like material, such as for example diamond-like carbon, a diamond-like nanocomposite, and a metal-containing diamond-like material. The mesas 112 can also comprise a contamination-reducing material comprising a high-purity ceramic, such as at least one of the silicon carbide, silicon nitride, silicon and

silicon oxide materials described above. The mesas 112 can also comprise an adhesion layer 140, for example comprising titanium, that improves adhesion of the coating 24.

[Specification page 19, lines 14-27.]

Claim 15 is being amended to cosmetically improve the claim language to match that of claim 12.

Thus the claim amendments add no new matter and are fully supported by the Specification and claims as originally filed. Entry of the claim amendments is respectfully requested on grounds the claim amendments clarify the issues for appeal, and are also made to overcome the current rejection based on Boyd et al. which was earlier retracted by the Examiner.

Reconsideration of the present case in view of the above amendments and the remarks herein is requested.

Allegedly Insufficient Declarations

Applicant acknowledges with disagreement the Examiners contention that the 37 C.F.R. 1.132 declarations submitted by Applicant on 20 December 2006 are insufficient to overcome the 35 U.S.C. §102(e) rejections based on U.S. Patent Application 2004/0055709 to Boyd et al. Applicant reserves the right to traverse the Examiner's conclusions and/or to provide additional evidence in support of the declarations. However, the issue is believed to be moot in view of the amendments and remarks made herein.

Claim rejections under 35 USC §102

The Examiner rejected claims 12, 14, 17 and 19 under 35 USC §102(e) as being anticipated by U.S. Patent Application 2004/0055709 to Boyd et al. (hereinafter Boyd et al.). The rejection is traversed.

In order to anticipate a reference, each and every element of the claim must be disclosed by a single prior art reference. W.L. Gore & Assocs. V. Garlock, Inc., (Fed Cir. 1983), cert. denied, 469 U.S. 851 (1984). Non-disclosure of a single element, feature or limitation of the claim negates anticipation.

Boyd et al. does not anticipate independent claim 12 because Boyd et al. does not teach each and every element of claim 12. As amended, claim 12 is to a substrate support comprising, inter alia, a contact surface comprising a plurality of mesas, the mesas comprising a coating of a diamond-like carbon material directly over a titanium metal adhesion layer. First, Boyd et al. does not disclose mesas having a separate adhesion layer. As can be seen in Figure 3C of Boyd et al., the mesas (202) are part of the body (102) of the chuck. Instead, Boyd et al. teaches a conformal coating 380 of diamond-like carbon that is applied directly to the surface of the underlying ceramic chuck because the inner surface of the coating 380 bonds with the surface of the chuck 102. Boyd et al. expressly teaches:

> Alternatively, as shown in FIG. 3C, the mesas 202 (or the flat chuck surface of FIG. 1A) may be coated with a conformal coating 380. One example of a conformal coating that is durable and has a low coefficient of friction is diamond-like carbon. ...
>
> As shown in FIG. 3C, the conformal coating 380 has an inner surface 384 that conforms to and bonds with the rough surface 304 of the chuck 102.

[Paragraphs 30 and 31, Boyd. et al.] If the inner surface of the coating bonds directly to the surface of the chuck, there cannot be an additional layer therebetween. Therefore, Boyd et al. does not teach an adhesion layer below a diamond-like carbon coating.

Still further, Boyd et al. does not disclose mesas having a titanium metal adhesion layer. By titanium metal, it is meant a layer of metal that exists in the form of the metal not a metal compound. Boyd et al. teaches that the mesas are generally formed from the same material as the chuck body - or other materials that do not list titanium:

> ... The mesas are generally formed from the same material as the chuck body, e.g. AlN. Alternatively. the mesas may be formed of other materials such as Si_3N_4, SiO_2, Al_2O_3, Ta_2O_5, SiC, polyimide, and the like.

[Paragraph 23.] Boyd et al. further discloses that the body of the underlying chuck can be made from "aluminum doped with metal oxide, such as titanium oxide (TiO_2)". [Paragraph 29.] Thus, Boyd et al. teaches mesas formed of the body of a chuck comprising aluminum oxide and titanium oxide, or mesas made of materials that do not include titanium metal. However, Boyd et al. does not disclose mesas having a layer of titanium metal. A layer of titanium metal over a ceramic body is not anticipated by a ceramic body comprising titanium oxide or mesas of material that do not include titanium. Thus Boyd et al. does not teach a mesa having a titanium metal adhesion layer.

For these reasons, Applicant requests withdrawal of the rejection of claim 12 under 35 U.S.C. §102(e) because Boyd et al. does not disclose each and every element of claim 12. In addition, Applicant requests withdrawal of the rejection of claims 14, 17 and 19 which depend from claim 12 and are not anticipated by Boyd et al. for at least the same reasons as claim 12.

Claim rejections under 35 USC §103(a)

I. The Examiner rejected claims 12, 14, 15, 19 and 58 under 35 USC §103(a) as being unpatentable over U.S. Patent 5,583,736 to Anderson et al. (hereinafter Anderson et al.) in view of U.S. Patent 5,969,934 to Larsen (hereinafter Larsen) and U.S. Patent 7,160,616 to Massler et al. (hereinafter Massler et al.).

Anderson et al., Larsen and Massler et al. do not render independent claim 12 unpatentable. Claim 12 is to a substrate support comprising a ceramic structure having an electrode embedded therein, the electrode being chargeable to electrostatically hold a substrate; and a contact surface comprising a plurality of mesas, the mesas comprising a coating of a diamond-like carbon material directly over a titanium metal adhesion layer.

Anderson et al. does not teach or suggest the claimed features of claim 12. As acknowledged by the Examiner, Anderson et al. "fails to explicitly [teach] an electrostatic substrate support structure specifically constructed as a ceramic comprising an electrode embedded therein, as is conventionally known in the art and/or with a diamond-like carbon coating contact surface." [Office Action, paragraph 14.] Anderson et al. does not teach a substrate support comprising "a ceramic structure having an electrode embedded therein, the electrode being chargeable to electrostatically hold a substrate" as claimed in claim 12. The claimed ceramic structure with an embedded electrode forms the basis of the present claim. Anderson et al. should not be relied upon as the primary reference in an obviousness rejection, when it fails to teach even the basic structure of the claimed invention.

Still further, Anderson et al. does not teach or suggest an electrostatic chuck comprising a coating of a diamond-like carbon material. Again, as stated in the present Specification, the diamond-like carbon coating material provides the primary benefits and advantages of the claimed structure in that the diamond-like coating reduces abrasion and contamination of substrates that contact the coating. Again, Anderson et

al. should not be relied upon as a primary reference as it also fails to teach the diamond-like coating.

Instead, the Office Action relies on Anderson et al. for its teachings to a substrate support comprising a plurality of mesas (islands 19) that are coated with silicon nitride to improve wear resistance. While the mesas are claimed in claim 12, Anderson et al. does not teach or suggest teach a coating of diamond-like carbon material on the mesas.

Still further, Anderson et al. also fails to teach a diamond-like carbon material directly over a titanium metal adhesion layer, as recited in amended claim 12. Applicant has discovered that mesas comprising a diamond-like carbon material directly over a titanium metal adhesion layer provide better adhesion of the diamond-like carbon material to the underlying ceramic structure, while still maintaining the contamination reducing and wear reducing properties of the diamond-like carbon material.

Thus Anderson et al. fails to teach almost all of claim 1. An obviousness rejection should not be based on a reference that fails to teach the claimed ceramic structure having an embedded electrode, fails to teach a coating of diamond-like carbon material, and still further fails to teach a titanium metal adhesion layer below the diamond-like carbon material.

Larsen and Massler et al. also do not make up for the deficiencies of Anderson et al., and the proposed combination of references is improper under 35 §103(a) and does not render claim 12 unpatentable. Larsen is relied upon by the Examiner to teach the use of a diamond-like carbon coating (element 220). However, Larsen fails to teach a diamond-like carbon material directly over a titanium metal adhesion layer, as recited in Applicant's claim 12. As previously explained, mesas comprising a diamond-like carbon material directly over a titanium metal adhesion layer provide better adhesion of the diamond-like carbon material to the underlying ceramic structure. At the same time, the contamination reducing and wear reducing properties of the diamond-like carbon

material is not compromised as the adhesion layer lies below the coating of the diamond-like carbon material. This combination of layers achieve a unique benefit that is simply not taught or suggested by either Larsen or Anderson et al.

To make up for the deficiencies of Anderson et al. and Larsen, the Office Action relies on Massler et al.'s general teaching of a multi-layer diamond-like system. However, Massler et al. also fails to teach or suggest application of the multi-layer diamond-like system to a substrate support comprising "a ceramic structure having an electrode embedded therein, the electrode being chargeable to electrostatically hold a substrate" as claimed in claim 12. The claimed substrate support having a ceramic structure with an embedded electrode is the basic structure of the present claim. Massler et al. fails to teach or suggest even the basic structure of the claimed invention.

Still further, Massler et al. does not teach to suggest an electrostatic chuck comprising mesas comprising a diamond-like carbon material directly over a titanium metal adhesion layer provide better adhesion of the diamond-like carbon material to the underlying ceramic structure to provide reduced abrasion and contamination of substrates that contact the coating. By "directly over" it is meant that there is no intervening layer between the two layers. Instead, Massler et al. teaches a multilayer DLC layer system comprising an adhesion and a transition layer that includes both metal and carbon in a gradient. The absence of an element of a taught combination of elements further negates an obviousness rejection. Massler et al. teaches:

> Layer System
>
> A DLC layer system in accordance with the invention is obtained by the production of a layer with the following layer structure.
>
> An adhesion layer with at least one element from the group of elements of subgroups IV, V and VI and silicon is situated directly on the substrate. Preference is accorded to an adhesion layer of the elements chromium or titanium, which have proved particularly suitable for this purpose.
>
> This is followed by a transition layer that is preferably formed as a gradient layer, in which the metal content diminishes in the direction at right angles to the

substrate surface, while the carbon content increases.

The transition layer comprises essentially carbon and at least one element of the group of elements that constitute the adhesion layer. In a preferred embodiment it may also contain hydrogen. Over and above this, both the transition layer and the adhesion layer contain inevitable impurities constituted by, for example, atoms incorporated into the layer from the surrounding atmosphere, for example, atoms of such inert gases as argon or xenon used in the process. ...

The end of the layer package is constituted by a layer that consists essentially exclusively of carbon and preferably hydrogen and, as compared with the adhesion layer and the transition layer, also has a greater thickness. In addition to carbon and hydrogen, this layer may once again contain inert gases like argon or xenon. But in this case it is altogether essential that there should be no additional metallic elements or silicon.

[Column 4, line 21 – column 5, line 3.] The multilayer DLC layer system comprising transition layers having a gradient of carbon, and still other layers consisting exclusively of carbon and preferably hydrogen, does not teach or suggest a diamond-like carbon material directly over a titanium metal adhesion layer. Massler et al. teaches the necessity of having complex intervening layers between the DLC layer and the underlying structure, which does not teach or suggest the present claims.

Still further, "[a] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." KSR Int'l Co. v. Teleflex, Inc., 127 S. Ct. at 1741. Instead, in order to determine whether an invention would have been obvious, it is useful to identify some "apparent reason to combine the known elements," either by looking to the teachings of the prior art, the knowledge of one with ordinary skill in the art, or demands present in the marketplace. Id. 127 S. Ct. at 1740. "[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.". Id. at 1741.

The Examiner fails to provide compelling reasoning to why one of ordinary skill in the art would have been motivated to (1) replace the silicon nitride coating of Anderson et al. with a diamond-like coating taught by Larsen and (2) then replace the Larsen coating with a multilayer coating of Massler et al. One of ordinary skill in the art would also have no apparent reason to substitute the multilayer coating of Massler et al. with the claimed simpler structure of a diamond-like carbon material which is directly over a titanium metal adhesion layer. One of ordinary skill in the art would not have found it obvious to replace Anderson's coating with another coating (Larsen's) and then replace that coating with another coating, and further modify and eliminate elements from the last coating substitution. Accordingly, this multiple step modification proposed by the Examiner does not constitute a proper rejection under 35 U.S.C. §103(a).

In actuality, it would not have been obvious to one of ordinary skill in the art at the time of Applicant's invention to replace Anderson et al.'s coating with the coatings taught by Larsen and Massler et al. First, the Examiner has provided no reason as to why one of ordinary skill in the art would have been motivated to replace Anderson et al.'s silicon nitride coating in the first place. According to Anderson et al., the resulting support "is tough and wear resistant, and particulates less than 2-3 micrometers are unlikely to abrade the chuck or lower the clamping force" (column 3 lines 24-27). Thus, one of ordinary skill in the art, after considering the teaching of Anderson et al. as a whole, would not have been motivated to modify Anderson et al. by removing the coating described by the reference as being fully functional.

Furthermore, one of ordinary skill in the art would have been taught away from making the Examiner's proposed modification. For example, Anderson et al. teaches the desirability of fabrication by simple and inexpensive processing techniques (see column 3 lines 20-22). In contrast, Massler et al. describes a complex and elaborate multi-step fabrication process for applying the taught multilayer coating system (see column 8 line 27 through column 13 line 54). Accordingly, one of ordinary skill in the art after considering the teachings of Anderson et al. would be steered away from a more complex coating process, particularly in view of the described adequacy of coating

taught by Anderson et al. In addition, one of ordinary skill in the art would not have found it obvious to replace the coating of Massler et al. with the coating of Anderson et al. for other reasons. For example, Anderson et al.'s coating is described as being a thin layer from 3000-6000 Angstroms. The multilayer coating of Massler et al. is significantly thicker (see column 5 lines 16-21). Note that even the lower range of the desired coating thickness in Massler et al. is twice the thickness of Anderson et al.'s coating. Further, most of the coating thicknesses in Massler et al. are thicker than the height of the mesas taught by Anderson et al. Thus, by applying the coating of Massler et al. to the mesas of Anderson et al., the mesas would effectively be leveled out. Also, Anderson et al. describes the use of silicon nitride coating to prevent shorting (see column 5 lines 2-5). Thus, one of ordinary skill in the art would not have found it obvious to replace the silicon nitride coating with the Massler et al. coating that includes metals and other materials that might make it less effective than the silicon nitride in preventing shorting.

For at least these reasons, claim 12 is not properly rejectable under 35 USC §103(a) as being unpatentable over Anderson et al., Larsen and Massler et al. The modification proposed by the Examiner is not one that would have been well within the grasp of one of ordinary skill in the art at the time the invention was made. In this regard, the Examiner has failed to establish that the teachings of Larsen and Massler et al. could be applied, with a reasonable likelihood of success, to Anderson et al. There is no evidence to suggest that this is a situation where the ordinary artisan could have combined the teachings in a manner that would result in the invention of claim 12 and there is no evidence to suggest the artisan would have seen the benefit in doing so. Furthermore, Applicant has unexpectedly found that the invention set forth in claim 12 reduces contamination of the backside of a substrate and increases substrate yields. Thus, claim 12 is allowable over the references cited.

Applicant requests withdrawal of the rejection of claim 12 under 35 U.S.C. §103(a). In addition, Applicant requests withdrawal of the rejection of claims 14, 15 and

19 which depend from claim 12 and are not rendered unpatentable by Anderson et al., Larsen and Massler et al. for at least the same reasons as claim 12.

Anderson et al., Larsen and Massler et al. also do not render independent claim 58 unpatentable. Claim 58 is to a substrate support comprising, inter alia, a contact surface comprising a plurality of mesas, each mesa substantially entirely composed of (i) a surface coating comprising a diamond-like carbon material having a carbon-hydrogen network, the surface coating comprising a coefficient of friction of less than about 0.3 and a hardness of at least about 8 GPa, and (ii) an adhesion layer consisting of metal between the ceramic support structure and the surface coating.

One of ordinary skill in the art would not have found it obvious to modify Anderson et al. in view of the teachings of Larsen and Massler et al. in a manner that would arrive at the invention of claim 58, as discussed above. Specially, Anderson et al., Larsen and Massler et al. do not teach a substrate support comprising a contact surface comprising mesas that are substantially entirely composed of a surface coating comprising a diamond-like carbon material having a carbon-hydrogen network, and an adhesion layer consisting of metal between the ceramic support structure and the surface coating.

Accordingly, Applicant requests withdrawal of the rejection of claim 58 under 35 U.S.C. §103(a).

II. The Examiner rejected claims 5, 6, 16, 18, 20 and 61-63 under 35 USC §103(a) as being unpatentable over Anderson et al. in view of Massler et al. and further in view of U.S. Patent 5,352,493 to Dorfman et al. (hereinafter Dorfman et al.). The rejection is traversed.

Claims 5, 6, 16, 18, 20 and 61-63 depend from one of independent claims 12 and 58. Anderson et al. and Massler et al. do not render claims 12 and 58 unpatentable for the reasons discussed above. Dorfman et al. is not relied upon to make up for the

deficiencies of Anderson et al. and Massler et al., nor does it. Thus, independent claims 12 and 58 are allowable over the combination of Anderson et al., Massler et al., and Dorfman et al. and the claims depending therefrom are also allowable over the combination of references for at least the same reasons as the claim from which they depend.

Should the Examiner have any questions regarding the above remarks, the Examiner is requested to telephone Applicant's representative at the number listed below.

Respectfully submitted,

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